

NEW ACCIDENT RESEARCH SYSTEM OF GERMAN INSURERS AND HIGHLIGHTS OF THE MAIN TOPICS

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1. ABSTRACT

Every year, the police in Germany record around 2.35 million road traffic accidents, which are then processed by the relevant statistics offices. In the same period, around 4.5 million damage claims related to road traffic accidents are reported to insurance companies. This discrepancy clearly demonstrates that there are a number of different ways of interpreting the real situation with regard to accidents. It is thus essential that general accident data provided by police and insurance companies is supplemented by in-depth data for more specific research.

This is why the accident research unit of the German Insurance Industry (GDV) set up an Institute for Vehicle Safety (IFM) where traffic accidents are investigated in depth, in accordance with statistical methodology. Accidents are analyzed on the basis of expert reports regarding car damage, in case accident reconstruction, police reports and injury descriptions of physicians/hospitals and are entered in specially-designed databases. In contrast to former accident material, the GDV databases provide direct access to accidents involving specific car makes/models, and the accident material is updated every year with information on new car models. With an average of 200 data fields, the total number of accident details which can be examined here is significantly higher than that available from the statistical databases and enables a targeted examination of key issues. Four areas of research will be reported as examples: heavy goods vehicles, car airbags, motorcycle accidents and cervical spine injuries.

2. INTRODUCTION

In our modern, hectic world, everything is in a constant state of flux, and not least the accident research work of the German Insurance Industry. With the decision of GDV to merge the Munich Institute for Vehicle Safety and the Institute of Road Traffic (GDV Cologne) into a new general research unit in Berlin by January 2004, a new phase of the accident research of GDV will be started, combining and preserving as much expert knowledge as possible.

3. DATA SOURCES

Large-scale analyses

The vehicle accident research work of the German Insurance Association began 1969 with the analysis of accident files from individual insurance companies. Even today, being allowed to examine accident files of all insurance companies is a possibility unique within Germany. Accident files contain information from police reports, eye-witness accounts, and expert appraisals of damage, the course of accidents and the injuries suffered by the persons involved. This information can be used to create databases with a greater information density than that provided by governmental data sources.

The downside of this amount of information was the difficulty of selecting specific incidents of relevance, since over 4 million claims per year were registered by the insurance companies. In order to filter this large quantity of accidents properly, notification campaigns were run in the years 1980, 1990 and 1998. During these campaigns, the insurance companies flagged those specific accidents which were relevant to the requirements of accident research. Important parameters used were: knowledge of data on injuries, the course of the accident and the vehicles involved.

The disadvantage of this method was the time factor, since 3-5 years have been reduced to elaborate the large scale accident material, these publications have now become an integral part of international accident research.

In the year 2000, the methodology used to filter relevant accident files was drastically changed. The insurance companies no longer had to participate in specific analysis campaigns. Instead, it became possible to index the data required for compiling statistics during the normal course of insurance business in such a way that this data could be pre-selected. The level of payment for claims were used to pre-assess the severity of accident. A "personal injury" attribute was also used to filter the statistical data of over 4 million annual accidents to around 18,000 accidents involving personal injury showing high claims costs and which had a high density of information.

Today, the accident files are ready for analysis after about one year. Furthermore, this information can now be updated continuously and periodic notification campaigns will no longer be required. All this means that 1500 accidents per year are now entered in this database.

This improved information density at the individual insurance companies also allows us to focus on specific vehicle types, a particularly important factor for vehicle-related safety systems.

Further sources of data and specific analyses

Our continuous work on accident research not only enhances reputation but also reflects a level of competence which can be a key factor in ensuring positive cooperation, especially in the public sector. One example of this is that over the last few years, the Bavarian police and the German Federal Ministry of the Interior have been progressively paving the way for the Institute for Vehicle Safety (IFM) to directly access police reports and special analyses.

This cooperation has led to projects in which, in addition to representative sample surveys, data for complete accident groups could be collected, such as all fatal accidents on Bavarian autobahns or all accidents involving young drivers in a specific administration area with 500,000 inhabitants.

The following examples of research include projects in the fields of commercial vehicles, airbag research for private cars, motorcycle accidents and cervical spine injuries.

4. ANALYSIS OF SERIOUS HGV (HEAVY GOODS VEHICLES) ACCIDENTS

A complete evaluation of the approximately 1,000 serious-injury HGV accidents reported in Bavaria in 1997 was completed in 2001.



Figure1: Missing Front Under-run Structure

In addition, head-on collisions between cars and HGVs, which are considered especially dangerous and which accounted for half of the car occupants killed in the accidents included in the research material, were analyzed in a cooperation with Munich University dissertation. The dissertation revealed that, at a conservative estimate, energy-

absorbent front underrun protection could potentially reduce the number of seriously injured car occupants by at least 40% and the number of fatally injured occupants by at least 11%.

In order to ensure that these systems become commercially available quickly before they have to be introduced by law in new trucks in August 2003, legislators are calling for financial support, in the form of a weight-based or length-based bonus, a reduction in vehicle tax or a discount on tolls for those who install them.

In addition, another project investigated the benefits of ESP in commercial vehicles. The conclusion was that up to 9% of serious HGV accidents could have been positively affected or even prevented using an ESP.

Representative Survey of HGV Drivers

In view of the rise in HGV accidents and the consequent need for countermeasures, a representative survey is being conducted among HGV drivers under the direction of the IFM. The survey is supported by DVR (the German Traffic Safety Council) and the "Human - Traffic - Environment" Institute for Applied Psychology (Institut für angewandte Psychologie „Mensch-Verkehr-Umwelt“, MVU).

The aim of the survey is to identify possible causes for the increasing number of HGV accidents and to use HGV drivers' experience and knowledge to improve HGV safety and drivers' working conditions.

The IFM interviewed 1,200 HGV drivers at service and rest areas in 2001. DVR-Zert has conducted further interviews at driver training centers and haulage companies in 2002. The report is available via IFM.

Bus and Coach Safety

As part of its work on bus and coach safety, the IFM has recorded all bus and coach accidents (approximately 950 cases) that occurred in Bavaria in 1998 and resulted in injuries. It aims to provide a general picture of the incidence and characteristics of these accidents and to determine the risk potential for occupants, in order to produce measures to improve active and passive bus and coach safety.

A preliminary core assessment of the total material was completed at the end of 2001. The results showed that occupants generally only suffer minor injuries. Serious injuries primarily occur in accidents in which the bus or coach tips/rolls over or in collisions with heavy vehicles.

Furthermore, the data points to a risk of injury for bus passengers which should not be underestimated in accidents caused by maneuvers (e.g. braking and driving off).



Figure 2: Bus Roll Over

In view of the number of bus and coach occupants involved in accidents in Europe every year (150 to 200 deaths and more than 30,000 injuries), the European Union has launched a project entitled ECBOs (Enhanced Coach and Bus Occupant Safety). The primary objective of the project is to develop proposals for new rules and improved standards for buses and coaches with the intention of helping to reduce the injuries suffered by bus and coach occupants involved in accidents by improving passive and active safety.

As part of this project, the IFM has created a database of well documented and reconstructed bus and coach accidents involving seriously and fatally injured occupants. The database, to which further cases will be added in the future, is intended as a basis for evaluations on follow-up projects.

5. ACCIDENTS INVOLVING CARS EQUIPPED WITH AIRBAGS

An important report was also compiled for the Federal Highway Research Institute of Germany (BAST) on the subject of "Accident injuries in vehicles equipped with airbags" with the help of external data sources. This involved carrying out a survey of the accident victims jointly with the technology center of the German Automobile Club ADAC.

This new data has confirmed that airbags are highly effective as protection not only for drivers but also for passengers. In the case of serious front-impact collisions, the proportion of serious to fatal injuries (MAIS 3+) is at least 20% lower for both drivers and passengers than for comparable accidents without airbags.

Initial experiences from real accidents indicate that side airbags (head/thorax airbags) provide significant additional protection.

In spite of the high benefit of airbags some problem areas also became apparent, however, with regard to the triggering of airbags, such as triggering while the vehicle is stationary, triggering during normal driving, triggering in minor accidents, failure of triggering failing in serious accidents, rollover accidents and under-run accidents involving trucks.

In addition, isolated cases of airbag aggression causing burns to the hands or to the face were identified.



Figure 3 : Passenger Airbag

The patterns of injury, however, reveal that the frequency of serious injuries could be further reduced if additional improvements were made to the interaction between the airbag and the seat belt force load limiter, and if intelligent sensor technology were introduced for multi-level airbag systems.

6. MOTORCYCLE ACCIDENTS CAUSED BY BRAKING

Around 15% of all motorcyclists involved in accidents fall prior to the actual accident. This doubles their risk of injury since the slide of the motorcyclist across the road generally ends on the hard parts of the other vehicle involved or on other obstacles.

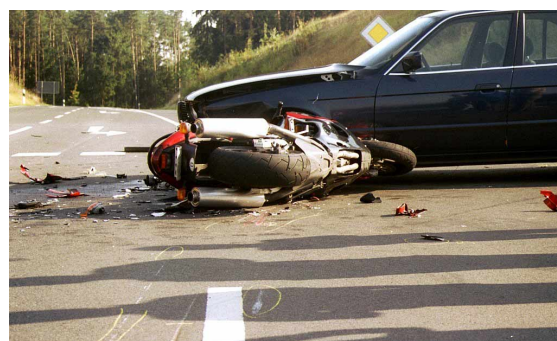


Figure 4: Typical fall in front of the opposing vehicle

These problems were researched by intensively examining the 1,100 motorcycle accidents on our database with regard to the mechanics of falls and the circumstances in which a fall preceded a collision. This revealed that locking of the front wheel due to over-braking as a reflex reaction was responsible for a fall in nearly 90% of the cases. These falls could have been avoided by an Anti

Lock Brake system (ALB). An even more significant feature of ALB, however, is that it enables full brake power to be used at all times without the risk of a fall.

This unequivocal result of our accident research is in strong contrast to the fact that only a small proportion of motorcyclists' vehicles are equipped with ALB (around 5% in Germany). This has led German insurance companies to launch a campaign, which on the one hand aims to dispel existing prejudices against ALB among motorcyclists and on the other hand to put considerable pressure on manufacturers to bring more and cheaper ALB motorcycles onto the market.

7. RISK OF CERVICAL-SPINE INJURIES IN CAR ACCIDENTS

Cervical-spine injuries are among the most common injuries suffered by car occupants wearing seat belts. One of the key aims of IFM's medical research is to reduce this type of injury, which is still on the increase. In 2001, a preliminary medical report form for cervical spine injuries including the QTF-Scale, developed by the IFM, was presented to experts. A dynamic seat-test standard is also on the way to be internationally harmonized by the International Insurance Wiplash Prevention Group (IIWPG) formed by Allianz Zentrum für Technik (AZT), GDV, Insurance Institute for Highway Safets (IIHS) and The Motor Insurance Repair Research Center (MIRRC) Thatcham. Steps will be taken toward having it adopted by the automobile industry and legislators.

A Medical Consultant Group discusses current problems concerning diagnosing, documenting and providing therapy for cervical-spine injuries in addition to medical report guidelines. It also deals with education for the public and preventive measures.



Figure 5: Human "test dummy"

New medical methods (muscle-reflex measurement, 3-D real-time ultrasound examination and balance tests) are employed to try to overcome the difficulty of distinguishing between objective and subjective diagnoses of cervical-spine injuries.

In particular, dynamic muscle measurement is set, if the basic research work remains constant, to become a standard for identifying exaggerated claims in a few years' time. However, a considerable amount of research is still needed on this method with regard to validation, standardization and simplification of the measuring procedure. Further basic research in these fields is being conducted in close cooperation with Ulm Surgical University Clinic.

The dynamic test for vehicle seats developed over the past few years by the IFM in collaboration with the Swiss Federal Institute of Technology in Zurich (ETH Zürich) has now been developed further using a special dummy for researching cervical-spine injuries (BIORID). This dummy is much more similar to real humans than the HYBRID dummy previously used, which was considered too stiff. A further series of comparative tests, which has, however, not yet been concluded, is being carried out with another dummy for researching cervical spine injuries (TNO RID) in order to find the best and most practical dummy for seat tests. To this end, a series of 13 of the latest vehicle seats were tested with HYBRID III, BIORID and the RID 2 dummy. The final assessment will soon be available.

Working Group for a Cervical Spine Injury Diagnostic Standard

The medical expert group set up by the IFM two years ago has now presented a second draft for a standard preliminary medical report form for diagnosing cervical spine injuries. The Swiss Insurance Association has already adopted large parts of this form, which are to be introduced across Switzerland in 2002.

To use this report form across Germany, the "Präsidium der Berufsgenossenschaft" has suggested a study be carried out to see how practicable it is in hospitals and doctors' surgeries. An expert committee, including IFM representatives, has been planned to produce a suitable design for the study.

Industry Workshop on Cervical Spine Injuries

At this workshop, the results of vehicle seat tests using the current dynamic test standard proposal were presented in a generalised form (only recognizable to the manufacturer concerned) and improvements were discussed. Some automobile manufacturers have now introduced improved seats, based on the IFM seat test standard, in series

production, but there is still considerable possibility for improvement from most manufacturers. It is important by publishing test results to ensure extremely simple, cheap solutions, which are nowhere near the optimum level of safety, do not delude the customer into believing that the manufacturer is offering adequate safety and a safety consciousness of the consumer will be promoted even with regard to seat/head restraints.

8. OUTLOOK

The wide range of possibilities for accident research offered by the Munich Institute for Vehicle Safety of the GDV could only be partly illustrated in the previous examples. Many more aspects of traffic safety can be addressed using the various data sources. An intensive analysis of model-related issues is planned for the year 2003/2004.

There is much more research work to be done by GDV in the future

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